

Customer No.: 31561
Docket No.: 10545-US-PA
Application No.: 10/708,664

REMARKS

Present Status of Application

Claims 1-6, 8-13 and 15-17 remain pending in the application. Claims 1-6, 8-13 and 15-17 are rejected under 35 U.S.C. 112, first and second paragraphs. Claims 1, 2, 5, 8, 9, 12, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kung (US Publication No. 2003/0222352). Claims 1, 2, 5, 8, 9, 12, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kung in view of Lee (US Publication No. 2002/0121692). Applicants have amended claims to overcome the rejections under 35 U.S.C. 112, first and second paragraphs. After entry of amendments, claims 1-6, 8-13, 15-17, and 22-23 remain pending and reconsideration of those claims is respectfully requested.

Discussion for 35 U.S.C. 112 rejections

Applicants have amended claims 1, 3, 4, 8, 10, and 11 to overcome the rejections under 35 U.S.C. 112, first and second paragraphs. Claim 17 has been amended too. Claims 22-23 have been added. **The amendments do not raise new issues after Final Action.**

Discussion for 35 U.S.C. 103 rejections

Claims 1, 2, 5, 8, 9, 12, and 15-17 are rejected under 35 U.S.C. 103(a) as being

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unpatentable over Kung. Claims 1, 2, 5, 8, 9, 12, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kung in view of Lee. Applicants respectfully traverse the rejections for at least the reasons set forth below.

1. With respect to independent claims 1 and 8, the wetting-barrier layer is specifically defined as a nickel while the bump includes the tin material. It should be noted in the present invention that the nickel in the wetting-barrier layer can reduce the diffusion of the tin atoms in the bump 230. As a result, the wetting effect between the UBM layer 220 and the bump 230 can be maintained ([0029]). *This has been non-obvious and rendered unexpected results when considering the present invention as a whole.*

Further, in order to make the attachment of UBM layer 220 to the bumps 230 more reliable, the thickness of the wetting-barrier layer is thicker than the adhesion layer or the barrier layer.

The thickness of the wetting-barrier layer is sufficient thick to improve the attachment.

2. In re Kung, it should be noted that the wettable layer 106, in general statement, can be copper, nickel, or gold ([0007]). In other words, the materials of the copper, nickel, and gold are considered equal. There is no specific consideration on the issue of the present invention about preventing the diffusion of tin atoms in bump by

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just choosing nickel. In considering this issue emphasized in the present invention, the wettable layer 106 should use the nickel but not copper or gold. Kung fails to specifically choose the nickel as the wettable layer.

Further, in order to make the attachment of UBM layer 220 to the bumps 230 more reliable, the thickness of the wetting-barrier layer is thicker than the adhesion layer or the barrier layer. This is not just a design choice. The sufficient increase of thickness of the nickel wetting-barrier layer can further improve the above effects.

3. Further with respect to claims 6 and 13, Kung in [0007] states that the oxidation resistant layer is made if the wettable layer is made from copper. This apparently discloses that the oxidation resistant layer is not made when the wettable layer is made from nickel. This is different from the present invention.

4. In re Lee, the metal layer 20 is used in the electroplating process so that the final layer 22 of solder is electroplated on the surface of the layer 20. Apparently, the layer 20 is not used to serve as a wetting-barrier layer of the present invention.

Further Similarly to Kung, the metal layer 20 can be, i.e., copper or nickel [0014]. In other words, Lee does not equally disclose the wetting-barrier layer of nickel in the present invention while the bump including tin.

Therefore, although Lee is further cited in combination with Kung, the features

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of the present invention are at least not specifically disclosed.

5. For at least the foregoing reasons, Applicants respectfully submit that independent claims 1 and 8 patentably define over the prior art, and should be allowed. For at least the same reasons, dependent claims 1-6, 9-13, 15-17, and 22-23 patentably define over the prior art as well. Wherein, claims 6 and 13 further define over the prior art.

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CONCLUSION

In view of the foregoing, it is believed that all pending claims 1-6, 8-13, 15-17, and 22-23 are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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Respectfully submitted,

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